46227

Phase I RFI/RI Report
Response to EG&G Comments

Rocky Flats Environmental Technology Site
Inside Building Closures
(Operable Unit 15)

U.S. Department of Energy
Rocky Flats Environmental Technology Site
Golden, Colorado

Environmental Restoration Program

January 1995

INTRODUCTION

This document responds to comments received from EG&G Rocky Flats, Inc on the Draft Phase I RFI/RI Report, Operable Unit No 15, Inside Building Closures, August 1994 Each comment received is listed and followed immediately by a response A copy of the original comment forms is provided at the back of the document for reference

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No and Title Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures

Reviewer Name(s) Mike Peters | Date 8/4/94

REVIEWER'S COMMENTS				RESPONSE
COMMENT NO	**PAGE NO**	**G OR M**	**COMMENTS**	**DISCUSSION**
1	General	G	This is not a standard comment form!	No response necessary
2	Sec 2 1 p 1 of 28	M	The site conceptual model should also be presented graphically (i e , as a flow chart) This may help visualize that there are no complete pathways	A graphical depiction of the conceptual model for OU15 has been added to the Report as Figure 2-1
3	Sec 2 2 1 p 7 of 28	G	Did we really store drums of carbon dioxide? Or should this be carbon tet, etc?	Carbon dioxide was identified as a constituent of concern in the Work Plan for IHSSs 179 and 180 based on information presented in a set of analytical reports prepared by Rockwell for Buildings 865 and 883 However, since carbon dioxide is a common component of the Earth's atmosphere and is not regulated as a hazardous waste or substance, it was not evaluated as part of the OU15 field investigations The text has been revised to reflect this position
4	Sec 3 2 p 3 of 36	G	Did we really expect to find VOAs? Especially using hot water! (Think about vapor pressures) No action required	Hot water rinsate sampling was chosen for the OU15 RFI/RI because it is representative of the methods (e g , steam cleaning or technology-based closure methods) that could potentially be used to close units at RFETS The hot water and vacuum effects of the system will tend to volatilize a certain portion of volatile compounds, but they will also tend to mobilize them and allow for some collection of these compounds in the rinsate Although the recovery of volatile compounds may not be complete, an indication of the presence of these contaminants on equipment and floor surfaces should result
5	Sec 3 3 1 7 of 36	G	Was a "beryllium counter" actually used or was this a colorametric field method or similar (Beryllium is not typically a radioisotope)	The smear samples were analyzed for beryllium using the Beryllium Activated Swipe Test or BeAST counter operated by EG&G Industrial Hygiene

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Reviewer Name(s) Mike Peters				Date 8/4/94
REVIEWER'S COMMENTS				RESPONSE
COMMENT NO	**PAGE NO**	**G OR M**	**COMMENTS**	**DISCUSSION**
6	Sec 4 2 3 p 20 of 44 Last para	G	Please clarify references to RCRA and CERCLA sampling	The RCRA and CERCLA sampling references have been modified to reflect that they apply to hazardous and radiological constituents, respectively
7	Table 4-2	G	Please include a summary table of RPD values and discuss in the text	A new tables has been inserted (Table 4-3) which summarizes the RPD values Discussion has been added to Section 4 2 2 under "Field Precision "
8	Table 4-1	G	Did the duplicates (and other types) include each sample suite (i e VOAs, metals etc) Could this be stated in the text or split out in the table?	The QA/QC samples were analyzed for the same constituents as their associated real samples, as described in the first paragraph of Section 3 5
9	Sec 4 2 2	G	Please include <u>all</u> equations used	The only equation used in Section 4 2 2 was for calculating RPD values That equation is given in the text

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM REVIEW/COMMENT RESOLUTION FORM			
Document No and Title Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures			
Reviewer Name(s) Jerry Anderson, RAD Engineering			Date 8/1/94
REVIEWER'S COMMENTS			RESPONSE
COMMENT NO	**PAGE NO**	**COMMENTS**	**DISCUSSION**
1	3 of 6 Ex Sum	Make the same comment for RADS that you make for Be data at the end of the 2nd paragraph	This sentence has been modified by deleting the phrase "and ongoing building economic redevelopment and Decontamination and Decommissioning (D&D) efforts " The future activities related to OU15 will be addressed in the Proposed Plan and CAD/ROD documents
2	4 of 6	Last sentence, 1st paragraph All RAD levels are within local control levels as well	This sentence was deleted from the text based on another comment
3	6 of 36	Section 3 3 1, 2nd sentence "This procedure is the base document for EMRG 3 1 "	The sentence has been rewritten to reflect this comment The words "equivalent to" have been replaced by "the base document for "
4	20 of 44 Sec 4	Higher post-rinsate smear samples could also be the result of cross-contamination from other parts of the RCA	It is likely that the radiological constituents detected in the smear samples from IHSSs 179 and 180 are not the result of waste management practices in the IHSSs, but instead from general radiological operations in the buildings (in essence, cross-contamination from other parts of the RCA)
5	18 of 42 Sec 5	5 2 1 3 Federal standards given in this section are for dose, not dose-rate 1 25 rem/qtr is a dose limit 2 5 mrem/hr is the dose-rate that would give you the dose 40 hrs/wk, 12 5 weeks	The text has been revised to clarify this point
6	23 of 92	Step 1 - Should you state the actual radiation control levels found in the DOE orders for surface contamination?	Radiological surface contamination standards were not included as ARARs for OU15 and therefore not evaluated as part of the RFI/RI
7	Sec 6 3 of 3	Cross-contamination could be a possible cause for alpha and beta/gamma contamination found in OU15 IHSSs	The same logic discussed in the response to Jerry Anderson (EG&G) Comment No 4 also applies to the alpha and beta/gamma contamination
8	Sec 7 2 of 3	2nd paragraph Dose is being referenced to here, not the dose rate	The text has been revised to clarify this point

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM REVIEW/COMMENT RESOLUTION FORM			
Document No and Title Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures			
Reviewer Name(s) Houk, R Zeke			Date 8/8/94
REVIEWER'S COMMENTS			RESPONSE
COMMENT NO	**PAGE NO**	**COMMENTS**	**DISCUSSION**
1	Sec 1 2 1, 1 2 2	These sections which list requirements are instrumental in presenting "necessary and sufficient" requirements, and add a lot of value Fight hard to keep them intact	No specific response required These sections and corresponding tables will be kept in the Final Report
2	Sec 7	Did your workplan call ARARs "ARARs" or "Benchmarks?"	The Work Plan uses the term "ARARs "
3	All	This RI very "RCRA" oriented--expect different comments from EPA (i e "not CERCLA enough")	No specific response required

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
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Document No and Title Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures

Reviewer Name(s) R S Roberts | Date 8/3/94

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO	**PAGE NO**	**COMMENTS**	**DISCUSSION**
1	Sec 5 0 Page 3 of 92	The approach to data evaluation outlined here is not consistent with the attached data evaluation guidance, "Guidance for Data Analysis of RFEDS data (for Subcontractors)," from M A Siders dated 1/27/94 Inconsistencies need to be resolved For example, the guidance says that "J" qualified data shall be used while the RFI/RI Report does not use this data	The only inconsistency exists with respect to the use of "J" qualified data This issue was discussed at length with CDPHE and it was agreed that "J" qualified data could be eliminated No comments to the contrary have been received from CDPHE or EPA
2	Sec 5 2 1 3 Page 19 of 92	The Atomic Energy Commission no longer exists It should be deleted	The phrase "Atomic Energy Commission" has been deleted from the sentence
3	Sec 5 2 1 3 Page 18 of 92	Why wasn't 10 CFR 834 used as an applicable radiation protection standard? It is replacing 5480 11 (DOE order)	10 CFR 834 was not available in time to support the preparation of the Final Report (it is currently anticipated that 10 CFR 834 will be enacted in early 1995) It is our understanding that the radiation protection standards are/will be consistent between 10 CFR 20, 10 CFR 835, 10 CFR 834, 29 CFR 1910, DOE orders and the DOE Radiological Control Manual
4	Sec 5 2 1 3 Page 19 of 92	Please reference the document that these dose limits were taken from Are they the most restrictive? Please explain why they are being used	The dose limits were taken from 10 CFR 20, and are consistent between that reference and the other ARARs identified in the approved Work Plan
5	Sec 5 2 8 2 Page 30 of 92	Why wasn't the same rigor applied to beryllium assessment as was applied to radionuclide assessment? Beryllium is a fairly strong carcinogen so I would think it needs to be assessed fairly rigorously	Section 5 2 8 2 Beryllium Evaluation has been rewritten to emphasize the results of the Be smear sampling within the IHSSs Sampling results indicate that the Be contamination in the areas surrounding IHSSs 179 & 180 is not attributable to the IHSSs

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Reviewer Name(s) R S Roberts | Date 8/3/94

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO	**PAGE NO**	**COMMENTS**	**DISCUSSION**
6	Appendix F	Regulations on internal dosimetry are based on receiving a committed effective dose equivalent in a calendar year The outputs from GENII quoted in Section 5 0 are in Annual Effective Dose Equivalent This discrepancy needs to be addressed	The GENII output reports Total Effective Dose Equivalent, which is the sum of the committed effective dose equivalent (internal dose) and the deep-dose equivalent (external dose) The terminology on page 2 of the output is confusing, however, the summation is of committed effective dose equivalents as can be seen from the column entitled "Committed Dose Equivalent " In addition, from comparing the tabulations on page 3 of the GENII output to the values summarized on page 2 of the output, it is apparent that the "Annual Effective Dose Equivalent" referred to on page 2 is actually the maximum annual Total Effective Dose Equivalent The text has been revised to clarify that the calculated total effective dose equivalent has been compared to the annual dose limits

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
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Document No. and Title: Draft Phase I RFI/RI Report - Operable Unit No. 15 .Inside Building Closures Page 1 of 2

Reviewer Name (s): Mike Peters Date: 8/4/94

REVIEWER'S COMMENTS				RESPONSE	
COMMENT NO.	PAGE000 NO	C or M	Comments	Discussion	Initial
1	General	G	This is not a standard comment form!		
2	Sec 2.1 P.1 of 2r	M	The Site conceptual Model should also be presented graphically (i.e., as a flow chart). This may help ~~the~~ visualize that there are no complete pathways.		
3	Sec. 2.2.1 P.7 of 2r	G	Did we really store drums of Carbon dioxide?!? or should this be carbon tet etc.?		
4	Sec 3.2 P.3 of 36	G	Did we really expect to find VOA's? especially using hot water! (Think about vapor pressures). — No Action required.		

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Document No. and Title: Draft Phase I RFI/RI Report - Operable Unit No. 15 Inside Building Closures Page 2 of 3

Reviewer Name (s). Mike Peters Date 8/4/94

REVIEWER'S COMMENTS				RESPONSE	
COMMENT NO	PAGE/SECTION NO	Comments Code	Comments	Discussion	Initials
5	Sec. 3.3.1 7 of 36	G.	Was a "beryllium counter" actually used ~~of~~ or was this a colorametric field method or similar. (Beryllium is not typically a radioisotope)		
6	Sec. 4.2.3 P. 20 of 44 Last ¶.	G	Please clarify references to RCRA & CERCLA Samples		
7	Table 4-2	G	Please include a summary table of RPD values ~~& fac~~ discuss in the text.		
8	Table 4-1	G	Did the Duplicates (& other types) include each sample suite (ie VOAs metals etc.) could this be stated in the text or split out in the table?		

AUG- 8-94 MON 5:41 P 03

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
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Document No. and Title: Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures Page 3 of 3

Reviewer Name (s): Mike Peters Date: 8/4/94

REVIEWER'S COMMENTS | RESPONSE

COMMENT NO.	PAGE/SECTION NO	G or A	Comments	Discussion	Initials
9	Sec. 4.2.2	G	Please include all equations used		

AUG- 8-94 MON 5:42

F 04

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No and Title: Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures — Page 1 of 3

Reviewer Name (s): Jerry Anderson, Rad Engineering — Date: 8/1/94

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO	PAGE000 NO	Comments	Discussion
1	3 of 6 Ex. Sum.	Make the same comment for rads that you make for Be data at the end of the 2nd paragraph	
2	4 of 6	Last Sentence, 1st paragraph All rad levels are with in local control levels as well	
3	6 of 36	Sect - 3.3.1 2nd Sentence "This procedure is the basis Document for EMRG 3-1."	
4	20 of 44 Sec 4	Higher post-rinsate Smear Samples Could also be the result of Cross-contamination from other parts of the TCA	

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
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Document No and Title: Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures — Page 2 of 3

Reviewer Name (s): Jerry Anderson, RMD Engineering — Date: 8/1/94

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO	PAGE000 NO	Comments	Discussion
5	18 of 42 Sec 5	5.2.1.3 Derived standards given in this section are for Dose not Dose-rate. 1.25 rem/qtr is a Dose limit 2.5 mrem/hr is the Dose rate that would give you the Dose 40hrs/wk, 12 5 weeks	
6	23 of 42	~~#2~~ Step 1 - Should you state the actual radiation control levels found in the DOE Orders for Surface Contamination?	

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
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Document No and Title: Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures — Page 3 of 3

Reviewer Name (s): Jerry Anderson, RAD Engineering — Date: _____

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO	PAGE000 NO	Comments	Discussion
7	Sec 6 3 of 3	Cross contamination could be a possible cause for the α and β/γ contamination found in OU15 IHSS's.	
8	Sec 7 2 of 3	2nd Paragraph. Dose's being referred to here not the Dose-rate.	

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM

REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures Page 1 of 1

Reviewer Name (s): HOUK, R. ZEKE Date: 8 AUG 94

REVIEWER'S COMMENTS | RESPONSE

COMMENT NO	PAGE NO.	Comments	Discussion
1	SEC 1.2.1 1.2.2	These sections which list Requirements are instrumental in presenting "necessary & sufficient" requirements, and add a lot of value. Fight hard to keep them intact.	
2	SEC 7	Did your workplan call ARARs "ARAR"s or "Benchmarks"?	
3	ALL	This RI very "RCRA" oriented --- expect different comments from EPA (ie "not CERCLA enough").	

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Document No and Title: Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures — Page 1 of 3

Reviewer Name (s): R.S Roberts — Date: 8/3/94

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO	PAGE/ SECTION NO	Comments	Discussion
1	Section 5.0 Page 3 of 92	The approach to data evaluation outlined here is not consistent with the attached data evaluation guidance, "Guidance For Data Analysis of RFEDS data (For Subcontractors)" from M A Siders dated 1/27/94. Inconsistencies need to be resolved. For example, the guidance says that "J" qualified data shall be used while the RFI/RI Report does not use this data.	
2	Section 5.2.1.3 Page 19 of 92	The Atomic Energy Commission no longer exists. It should be deleted.	

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
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Document No and Title: Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures Page 2 of 3

Reviewer Name (s): RS Roberts Date: 8/3/94

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO	PAGE NO	Comments	Discussion
3	Section 5.2.1.3 Page 18 of 92	Why wasn't 10CFR834 used as an applicable radiation protection standard? It is replacing 5480.11 (DOE Order).	
4	Section 5.2.1.3 Page 19 of 92	Please reference the document that these dose limits were taken from. Are they the most restrictive? Please explain why they are being used.	
5	Section 5.2.8.2 Page 30 of 92	Why wasn't the same rigor applied to beryllium assessment as was applied to radionuclide assessment? Beryllium is a fairly strong carcinogen so I would think it needs to be assessed fairly rigorously	

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Document No. and Title: Draft Phase I RFI/RI Report - Operable Unit No 15 Inside Building Closures Page 3 of 3

Reviewer Name (s) RS Roberts Date: 8/3/94

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO	PAGE000 NO	Comments	Discussion
6	Appendix F	Regulations on internal dosimetry are based on receiving a committed effective dose equivalent in a calendar year. The outputs from GENII quoted in Section 5.0 are in Annual Effective Dose Equivalent This discrepancy needs to be addressed.	

EG&G ROCKY FLATS

INTEROFFICE CORRESPONDENCE

DATE January 27, 1994

TO Distribution

FROM M A Siders, Geosciences, Bldg 080, X6933 MAS

SUBJECT GUIDANCE FOR DATA ANALYSIS OF RFEDS DATA (FOR SUBCONTRACTORS)
MAS - 001-94

Based on a request from Rick Roberts, the following guidance for data analysis was produced for use by Operable Unit (OU) Managers and their subcontractors This document offers practical advice for users of Rocky Flats Environmental Data System data and is offered as guidance in an attempt to maximize consistent treatment of the analytical data

Please review and comment on this document, and return your comments to M A Siders, as soon as possible (Dr Siders will be on vacation from Friday, February 4, returning Monday, February 14, 1994) If comments are received by mid-day February 3, the final guidance document will be released the week of February 7, otherwise, the final document will not be available until the week of February 14, 1994

MAS cb

Attachment
As Stated

Distribution

G A Anderson
C A Bicher
M S Buddy
C H Hayes
J K Hopkins
R Z Houk
P J Laurin
M E Levin
E C Mast
M F McHugh
R S Roberts

PRACTICAL SUGGESTIONS FOR USERS OF RFEDS DATA

In general, there are actually three related issues that may arise for users of RFEDS data

(1) How to deal with multiple detection limits
(2) How to treat non-detects
(3) How to perform data cleanup

1.0 MULTIPLE DETECTION LIMITS

The standard reporting format for RFEDS data (through 1993) gives one field for the reported detection limit Unfortunately, this one field may contain either of three variables the instrument detection limit (IDL), the method detection limit (MDL), or the contract-required detection/quantitation limit (CRDL/CRQL) The significance of these three different types of detection limits is that, for inorganic analytes (i e , metals and water-quality parameters), the CRDL may be one to two orders of magnitude greater than the corresponding IDL for a particular analyte For organic analytes, the IDL and CRQL are generally of similar magnitude, so the value given in the reporting-limit field should be fairly constant (dilutions are an exception to this)

The "Gansecki rule" was proposed (in EPA comments on the *1990 Background Geochemical Characterization Report*) as an attempt to eliminate the high-value non-detects from the data set The "Gansecki rule" calls for exclusion of all non-detects greater than two times the minimum reporting limit, however, this "rule" has come under criticism as arbitrary and possibly not technically defensible

1.1 Summary and Recommendations

* Decisions based on a graphical review of the data distribution are thought to be more technically defensible than the general application of an arbitrary rule (i e the "Gansecki rule"), even if the "rule" comes from EPA comments The use of professional judgement and technically arguable reasoning, is recommended It is incumbent upon the data users to document all steps in their analysis of RFEDS data

  EG&G will review the graphics jointly with the subcontractor, and provide guidance at this point in the data analysis

* The values of CRDLs for metals, as given in EPA SOW for Inorganics Analysis, should be compared with the data set to ascertain what percentage of the data is reported as the value of the CRDL (see Table 1)

  EG&G will review the data jointly with the subcontractor, and give directions on how to proceed

Table 1. INORGANIC TARGET ANALYTE LIST (TAL)

Analyte	CRDL (ug/L)
Aluminum	200
Antimony	60
Arsenic	10
Barium	200
Beryllium	5
Cadmium	5
Calcium	5000
Chromium	10
Cobalt	50
Copper	25
Iron	100
Lead	3
Magnesium	5000
Manganese	15
Mercury	0 2
Nickel	40
Potassium	5000
Selenium	5
Silver	10
Sodium	5000
Thallium	10
Vanadium	50
Zinc	20
Cyanide	10

2.0 TREATMENT OF NON-DETECTS

For those data sets containing censored data, the method of replacement affects the value obtained for the mean and upper confidence limit (UCL) The mean and skewness generally increase in deviation from the true values, as the proportion of non-detects increases The deviation from true mean value is also greater as the amount of skewness increases Maximum Likelihood Estimation (MLE) generally does a better job of estimating skewness than does simple substitution

Sanford *et al* (1993) tested the "accuracy" of different replacement methods for non-detects, evaluating the accuracy of different methods by the root mean square error, and by a scoring system Sanford *et al* (1993) concluded that the performance of the different replacement methods were, as follows

SCORING OF DIFFERENT REPLACEMENT METHODS

	MLE	Simple Sub	Drop Non-detects
40% Non-detects	93%	89%	64%
80% Non-detects	61%	54%	29%

Therefore, for as much as 80-percent non-detects, simple substitution and MLE have been shown to have similar "strength" (see Sanford *et al* , 1993) In cases with greater than 80-percent non-detects, the results obtained from simple substitution and MLE may be quite different, and can lead to different — possibly opposite — conclusions.

Certainly the *worst* possible treatment of non-detects is to drop them from the data set (Helsel, 1990, Sanford *et al* , 1993) Non-detects should NEVER be excluded from any statistical comparison of OU versus background data

Given the cumulative uncertainties throughout the processes of sampling and chemical analysis, the possible error introduced by using simple substitution rather than using MLE replacement of non-detects, is probably acceptable The standard practice for treatment of non-detects, as given in EPA statistical guidance for RCRA sites (1989, 1992), calls for simple substitution using ½ the detection limit, for non-detect rates of as much as 15 percent However, for RFEDS data, it may be better to use ½ the result if the CRDL or the MDL is given in the reporting-limit field instead of the IDL

At this point in the data analysis, EG&G will assist the subcontractor in making the appropriate decision as to which value (result or reporting/detection limit) to use

2.2 Summary and Recommendations

* Data for which all unit designations are blank, should be deleted from the working data set if it is not possible to obtain verification of units

* As a replacement value for any non-detect prior to standard statistical analyses, the data user may choose to do the following

  > Use ½ the detection limit, if the IDL is given in the detection-limit field
  > Use ½ the result, if the CRDL is given in the detection-limit field
  > Maximum-likelihood methods (see Helsel, 1990), in which non-detects are fitted to a distribution and assigned a range of values, may also be used as a method of replacing non-detects (NOTE This method does require the analyst to choose a distribution — either lognormal or normal — to assign values to non-detects The analyst should also be aware of back-transformation bias in the case of log-transformed data)

Based on the study of Sanford *et al* (1993) and EPA CERCLA guidance, the

recommendation of EG&G is to use ½ the detection limit as a replacement value for analytes with as much as 80-percent non-detects For analytes with a non-detect rate of greater than 80 percent, the use of inferential statistical analysis is not recommended EG&G will provide additional guidance for treatment of these high-rate non-detects

* All data for radionuclides should be used as detects, except for rejected data (validation code = R) For liquid samples, radionuclide data are generally given in units of PCI/L, for solids, radionuclide data are in PCI/G, except for TRITIUM data, which are always in units of PCI/L

* For organics, the IDL and the CRQL are similar in magnitude, so the result qualifier or validated result qualifier can generally be used to determine the percentage of non-detects Non-detects for organic analytes are generally qualified "U", but other designations may also appear in the result-qualifier field (for additional information about result qualifiers, see attached Appendix C from the *1993 Groundwater Geochemistry Report*) "Hits" of some common lab contaminants such as acetone, methylene chloride, and certain phthlates may indicate contamination if detected in the associated lab blank, such sample results are designated by a "B" in the lab-qualifier field EPA guidance for risk assessment (1989 EPA/540/1-89/002) indicates that if the concentration of a common lab contaminant in a sample is more than 10 times the concentration of the same analyte in the blank, then the sample result is taken to be a real "hit", not just lab contamination For other analytes that are not typically found as lab contaminants, EPA guidance (EPA, 1989) states that if the concentration in the sample exceed 5 times the concentration in the blank, then the sample result is taken to be a real "hit", not just lab contamination

* For metals and water-quality parameters, it is ineffective to rely on the result qualifier alone The following criteria have been employed to differentiate detects from non-detects, and are suggested as guidelines for the data

  > If a validated qualifier is available, it is used rather than the lab qualifier

  > If the qualifier contains a "U", the result is taken as a non-detect (i e , censored data point)

  > If the lab qualifier and validation qualifier fields are blank, the result is used as a detected value

  > If the qualifier had a "B" code (indicating that the result was above the IDL but below the CRDL), or if the qualifier had a "J" or "JA" code (estimated value above the IDL but below the CRDL), the result is taken to be a detected value

  > Other characters also are found in the qualifier field, and, barring any other evidence to the contrary, these are generally accepted as detects

* All data should be reviewed graphically (non-detects and detects together) prior to the application of any statistical tests This will help to illustrate any potential problems, such as high-value non-detects (e g , non-detect values reported as the value of the CRDL)

EG&G will give guidance to the subcontractor after jointly reviewing the graphical presentations of the data

3.0 ISSUES REGARDING DATA CLEANUP

The so-called "data cleanup" of RFEDS output is mostly a task to make the data consistent This consists of a time-consuming series of steps (which should be documented by the data user) including the standardization of units, standardization of geologic codes, standardization of locations if the location designation has changed over time, standardization of analyte names (usage has changed over the years), deletion of blank "form-generated" records for which no results are given, exclusion of QC data (rinsates, etc) from the working data set, removal of any rejected (val = 'R') data, replacement of non-validated records with corresponding validated records (if available), correction of incorrect units (e g , pH should have 'PH' as the unit, *not* 'MG/L' as the unit), averaging of qc DUP/REAL pairs, appropriate use of DIL data, outlier analysis, etc

Upon receipt of RFEDS data, the user should verify the field positions of all variables in the RFEDS ASCII output file After verification, the ASCII file may be transformed into data files for a specific software (e g SAS, Lotus, Excel, SPSS, etc) to be used in the data manipulation It is recommended that the user create successive generations of the data files rather than just continually updating the original data file, this simplifies data analysis if back-tracking is required for any reason

Successive generations of data files may proceed as follows (this is just a suggestion)

(1) Original data files created from RFEDS ASCII files these files contain the entire RFEDS data pull, including QC samples, rejected data, etc

(2) Second generation of data files, drop QC samples (except qc DUPs of DUP/REAL pairs), rejected data, blank form-generated records, tentatively identified compounds (TICs), etc Create new variables, using validated data (where available) to supersede non-validated results, units, qualifiers, and detection limits Standardize units within each analyte suite Standardize location names if designations have changed over time (check cross-reference listings of well location names, etc) Standardize geologic codes Standardize analyte names (e g "PLUTONIUM-239,240" = "PLUTONIUM-239/240", etc)

(3) From (1), create a separate file with QC data for analysis of data quality Check the PARCC parameters (precision, accuracy, representativeness, completeness, and comparability)

(4) From (2), create a third generation of data files with averaged DUP/REAL pairs (change REAL value to the mean value of the averaged DUP/REAL pair, then delete the DUP record) In the case of DUPs with no corresponding REAL record, change "DUP" to "REAL" (NOTE Prior to averaging of DUP/REAL pairs, sort the data by LOCATION, SAMPLE NUMBER, SAMPLE DATE, and ANALYTE This

should bring together all existing DUP/REAL pairs)

Treatment of DIL data requires the data analyst to find the analyte(s) that necessitated the dilution, these should have a qualifier of "E" (for exceedance) The DIL result(s) for the E-qualified analyte(s) should be used in the data analysis, other analytes may have results reported for the DIL sample analysis, but these results should be deleted if these analytes in the original undiluted sample were NOT qualified as "E"

Outlier analysis, and exclusion of identified outliers from data analysis, may not be allowable by the regulatory agencies That is, it is easy to argue that an extremely high value in background is probably an outlier that can be excluded from data analysis, but it is difficult to argue that an extremely high value in an OU is an outlier rather than contamination

The RFEDS has shown continuous improvement in the quality of data contained in the system Newer data (1992-93) are generally "cleaner" than historic (pre-1992) data However, all data users need to be made aware of potential pitfalls before applying statistical tests to the data The steps listed in the previous paragraph give a general overview for the process of data cleanup

3.1 Summary and Recommendations

* All data users should carefully document the steps used in the process of data cleanup If questions arise, review of this documentation should be able to provide the necessary information

* RFEDS and the Sample Management Group are committed to Continuous Improvement, recent data (1992 to present) have fewer problems than historic data (pre-1992) Issues of duplicate records, incorrect units, etc , are currently being addressed

4.0 REFERENCES

Helsel, D R (1990) Less than obvious statistical treatment of data below the detection limit *Environmental Science & Technology*, v 24, n 12, p 1766- 1774

Sanford, R F , Pierson, C T , and Crovelli, R A (1993) An objective replacement method for censored geochemical data *Mathematical Geology*, v 25, n 1, p 59-80

U S Environmental Protection Agency (February, 1989) *Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities, Interim Final Guidance* EPA/530-SW-89-026

U S Environmental Protection Agency (July, 1992) *Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance*

APPENDIX C

Laboratory Data Qualifiers

Qualifier	Definition	Include in Data Analysis	Detected ("Hit")
+	Inorganics· correlation coefficient for the matrix spike analysis is less than 0 995 (estimated value)	yes	yes
-	Inorganics, duplicate analysis is not within control limits (estimated value)	yes	yes
A	organics Identifies tentatively identified compound (TIC) as a suspected aldol condensation product	yes remove to TIC table	no
B	organics warns that analyte also detected in blank *note for common lab contaminants include as hit if blank result > 10 x det limit, for all other organics include as hit if blank result > 5 x det limit* Inorganics reported value is less than CRDL but greater than IDL rads constituent also detected in associated blank whose concentration was greater than CRDL and/or minimum detectable activity (estimated value)	yes yes yes	yes yes yes
C	organics pesticide result confirmed by GC/MS rads presence of high TDS in sample increased minimum detectable activity	yes yes	yes yes
D	organics, identified in an analysis at a secondary dilution	yes	yes
E	organics compound exceeded calibration range of instrument, sample must be reanalyzed Inorganics value is an estimate due to interference (estimated value)	no yes	no yes
F	rads, for alpha spectrometry - FWHM exceeded acceptable limits (estimated	yes	yes
G	TOC, dilution result exceeded range of instrument, estimated result	yes	yes
H	rads, sample analysis performed outside of method-specified maximum hold-	yes	yes
I	organics, interference with target peak (estimated value)	yes	yes
JB	organics, result below detection limit and analyte detected in lab blank	yes	no
J	organics MS data indicate presence of compound but below detection limit (estimated value) Inorganics value greater than IDL but control sample analysis not within control limits (estimated value)	yes yes	yes yes
L	undefined	no	no

Qualifier	Definition	Include in Data Analysis	Detected ("Hit")
N	organics compound presumed present (TIC)	yes remove to TIC table	no
	inorganics spiked sample recovery is not within control limits (estimated value)	yes	yes
N*	inorganics spiked sample recovery and duplicate analysis are not within control limits (estimated value)	yes	yes
R	validation code for rejected data entered in lab qualifier field/unusable data	no	no
S	inorganics, the reported value determined by the method of standard	yes	yes
U	organics and inorganics, analyte analyzed but not detected at the quantitation	yes	no
UC	organics, pesticide result confirmed but below detection limit	yes	no
UE	rads, detection limit reported as result (?)	no	no
UJ	organics, analyzed but not above the detection limit, estimated value	yes	no
UN	organics compound presumed present but below detection limit	yes (TICs)	no
	inorganics spiked sample recovery not within control limits and sample result below detection limit	yes	no
UW	inorganics post-digestion spike for GFAA analysis is out of control limits and sample result is below detection limit	yes	no
UX		yes	no
V	validation code for valid data entered into lab qualifier field	yes	yes
W	inorganics post-digestion spike for GFAA analysis is out of control limits while sample absorbance < 50% of spike absorbance	yes	yes
X	organics (pre-1992) lab software flag (combines more than one qualifier) - not defined	no (unless accompanied by a validated result)	no
	inorganics (pre-1992) detection limit greater than normal, sample matrix interference	yes	yes
	other (OU7 RFI/RI samples) result by calculation defined in GRRASP	yes	yes
Y	rads, chemical yield exceeded acceptable limits (estimated value)	yes	yes

Note on use of X qualifiers X is defined in the GRRASP as a result determined by calculation not by direct laboratory analysis Therefore, for samples analyzed during the period that GRRASP has been in effect (since January 1992) the results qualified by an X will be treated as estimated values (similar to J) For historic data, when GRRASP was not used by laboratories, an X qualifier has two definitions For organics, the X is a flag entered manually by the laboratory, but is not defined in RFEDS Therefore, organic results qualified by X are not considered usable data, unless a validated result is given For inorganics, an X qualifier indicates that the detection limit for the analyte is higher than normal due to matrix interference

An inorganic qualified with an X will be treated like a J result. The X qualifier is sometimes also used with other qualifiers (I e , UX, XJ) In these cases the meaning of X depends on the analyte and the date of the analysis

Validation Qualifiers

Qualifier	Definition	Include in Data Analysis
J	estimated result	yes
B	lab qualifier	no
C	lab qualifier	no
N	lab qualifier	no
S	lab qualifier	no
P	undefined	no
A	acceptable result	yes
JA	acceptable result (for estimated value)	yes
R	rejected result	no
V	valid result	yes